

The Legal Precedent in Online Dispute Resolution

Davide CARNEIRO ^a, Paulo NOVAIS ^{a,1}, Francisco ANDRADE ^b, John
ZELEZNIKOW ^c and José NEVES ^a,

^a*Department of Informatics, University of Minho, Braga, Portugal*

^b*Law School, University of Minho, Braga, Portugal*

^c*School of Management and Information Systems, Victoria University, Melbourne,
Australia*

Abstract. The advances observed in the last years in telecommunication technologies rapidly brought along new ways of doing business. This new reality, however, has not been so rapidly followed by the entities responsible for dealing with the conflicts that arise from these interactions, now undertaken in an electronic format. Traditional paper-based courts, designed for the industrial era, are now outdated. The answer to this problem may rely on the new tools that can be built using new artifacts from fields such as Artificial Intelligence. Using these tools the parties can simulate outcomes, thus having a better notion of the possible consequences of a legal dispute, namely in terms of the Best and Worst Alternative to Negotiated Agreements. In this paper, we present our agent-based architecture for such a tool, UMCourt, placing special emphasis on a particular agent that, based on the concept of legal precedent, gives its users a set of possible outcomes of a case, based on the observation of past similar cases and learns new cases in order to enrich its knowledge base about the Portuguese labor law.

Keywords. Online Dispute Resolution, Artificial Intelligence, Case-based Reasoning

1. Introduction

New and emerging technologies have led to new ways of doing business. An old paradigm that was based on paper and in which concepts like nationality or location were of major importance is now being replaced by a new paradigm in which people from virtually anywhere in the world enter into electronic interactions, regardless their location or even their nationality. The development of these processes has led to a vast growth in online activities such as online contracting, which has inevitably led to a growth in the disputes between the parties involved in these activities.

Traditional courts that were formatted to a paper-based reality shaped after the industrial revolution are now outdated. A trend that has come to light recently is that if the disputes are generated online, they should also be solved online. In fact, the same technologies that allowed for online transactions to develop and online conflicts to appear may also be used to implement online dispute resolution mechanisms [1]. These mechanisms can be found in a heterogeneous group of systems that range from “simple”

¹ Corresponding Author: pjon@di.uminho.pt.

information systems designed to assist their users, to complex automated negotiation systems [2]. The main objective of these systems is to avoid litigation in traditional courts by using other paths, namely mediation, negotiation or arbitration, in a virtual location instead of a physical one [3]. This way it is expected that the costs and time spent to solve the case can be reduced, bringing the justice closer to people [4].

UMCourt is being developed at University of Minho in the context of the TIARAC project (*Telematics and Artificial Intelligence in Alternative Conflict Resolution*) that intends to help parties involved in legal disputes. It is an agent based system, therefore flexible, dynamic and expansible, that not only provides help in the management and access of information by the parties but also produces a range of possible outcomes and provides a better notion of the possible consequences and opportunities of the conflict to the parties.

UMCourt [5] represents the first steps to implement the ideas depicted in the introductory section. Its building blocks are agents or groups of agents with well defined roles that, through their interactions, configure an intelligent system. Following the methodology proposed by [6], our work in this system began with a high level definition of the members of the architecture in terms of their roles, resulting in a configuration of four high-level agents: Security, Knowledge Base, Reasoning and Interface. These agents were then subdivided into more simple agents so that each one could perform a simpler and better defined role in the system. The result of this cut down process is a group of 20 agents [5]. For the sake of space and as it is out of the scope of this paper, these agents will not be presented here in more detail.

We will thus focus in the central piece in this system, as introduced in this paper, addressing the specific domain of the Portuguese labor law: a Case-based Reasoning (CBR) [7] model that, based on disputes that happened in the past and their respective outcomes, is able to compute the possible outcomes of a current case. Our belief is that the appropriate path to follow relies on the fact that law itself implements a very similar concept: the legal precedent [8]. The Oxford dictionary defines this concept as “a previous case or legal decision that may or must be followed in subsequent similar cases”. In the Portuguese reality there is the concept of persuasive precedent that has more or less influence on the new cases according to the instance of the court that originated it.

2. Estimating and Learning Outcomes

The determination of outcomes is one important feature in online dispute resolution systems. When the parties have an approximation of the possible outcomes they can take wiser decisions thus achieve better outcomes.

2.1. The Structure of a Case

The Portuguese labor law is organized into 566 articles, each one possible divided into some numbers, and the numbers divided into points concerning very specific situations of the subject of the article [9]. The structure of a case for this particular algorithm has been developed having in mind the Portuguese legal reality. A case is constituted by two main groups of information. The first group contains all the personal information needed for uniquely identify each party such as the name, address contact information, among others. When a case is created it contains only this information as well as the

past cases in which the party participated. As the process progresses, the second group of information is filled.

This group contains all the legal information and is organized according to the structure of the model of the Portuguese labor law. We have therefore several main components: the statement of guilt which is issued by the employer and contains all the information about the event that led to the dismissal, the employee answer, several eventual witnesses and the opinion from the workers commission or union. All this information is structured in XML files that respect XML schemas that were previously defined. This allows for the information to be automatically processed and generated in an automatic fashion HTML pages or even legal documents. Among other information, each of these components contains a list of pairs that is composed by a pointer to a specific law and a relation that describes how this law is related to the case. This means that the employer should state in the statement of guilt which laws were not respected by the employee and in which conditions, the employee should do the reverse in his defense, as well as the witnesses and the union or worker commission.

Information like this constitutes all that is needed for the system to try to determine the possible outcomes. The system does so by analyzing the cases stored in the knowledge base and comparing them to the current case: cases which address similar laws in similar circumstances should have similar outcomes. This process is described in detail in the following sections. The case contains also other accessory information such as the value of the case, which denotes the percentage of cases in which it has been successfully applied by the system or the outcome of the case.

2.2. The Similarity Function

A key element in this algorithm is the similarity function. This function is responsible for measuring the degree of similarity between two cases. As stated in the previous section, the information of a case is organized into two groups: the personal information and the legal information. Concerning the similarity issue, the personal information, is generally the less important as an outcome should not depend on parameters like the name of the employer or employee. The range of the output values in this field is a pair of values denoting that the values are either similar or not.

The higher degree of importance is therefore given to the legal information of a case. The first step in determining the similarity is to compare the cases in terms of the parts of the law that are addressed.. Evidently, a case that addresses the same issues will have a higher degree of similarity. The degree of similarity will be higher if more specific aspects like the number or even the point match. In the limit, the similarity will be the highest if the laws and their relation with the events are the same.

The similarity function therefore looks at three main aspects when determining the affinity between two cases: their high level subjects (articles), their specific issues (numbers and points), and their relation with the events related. The weight given to each of these aspects on the calculus of the final similarity is not the same. We assign the highest importance to the high level subjects as decision makers often do not need to look at precise aspects of the law to determine that, for example, an employee did not fulfill its obligations. In fact, the law does not provide an extensive description of concepts that are common sense: informal principles. The second aspect with more weight are the relations of the laws with the events. It is important to clarify in which terms each law is being invoked. At last, the lesser weight is given to the specific numbers and points of the article that were used by the parties. The practical results of

the application of this similarity function to a specific case are detailed in the Results section.

$$f_{sim}(S_{pi}, S_{hl}, S_l, S_{si}) = 0.05 * S_{pi} + 0.5 * S_{hl} + 0.3 * S_l + 0.15 * S_{si} \quad (1)$$

2.3. The CBR Algorithm

The CBR algorithm is inspired in the one presented by [10] and is organized into four phases (**Figure 2**. The CBR model used. Figure). The first phase is the Retrieve one. In this phase the system, based on a similarity function, chooses a group of the most similar cases. At the end of this phase, two different situations can occur. Either there are similar cases or the case is completely new to the system. If this is the case, the system moves to the last phase in which it waits for the end of the ODR process so that it can learn what was the outcome and enrich its knowledge base with a new case, being better prepared for dealing with future ODR processes. If, in the other hand, there are similar cases, the system moves to the second phase, which is called Reuse.

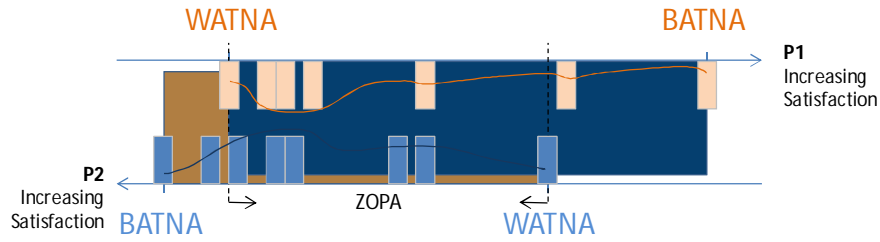


Figure 1. A graphical representation of the possible outcomes of the case for each party.

This phase takes place if, despite the cases are similar, they need to suffer an adaptation. Cases may need to be adapted if a significant part of the information is very similar but small and not very important parts are not. One of the best examples of a case that needs to be adapted is a case in which all the information except the personal information of the parties is very similar, i.e., all the laws that were broken, the complaints from the parties and the arguments presented are very much the same. This information is the most relevant and is the one that better characterizes the case and is very similar to the known case. The personal information, in the other hand, although being different is not very important for the case as we believe that justice does not depend on factors like the name of the parties. The adjustment would therefore consist in changing the names of the parties and maintain the remaining information.

Having adapted the case as needed, the system advances into the Revise phase. In this phase, the outcomes and their likeliness to occur according to the characteristics of the present case are presented to the user in a graphical fashion (Figure). In this graphical representation, the parties can see the several cases that are being used by the system to evaluate the current one in the form of colored rectangles. The likeliness of a given outcome to happen is calculated based on the number of the cases in the close area of that outcome as well as the importance of those cases, given in terms of the precedent. This likeliness can be visualized by the parties in the shape of a colored line that is more distant from the axis as the likeliness grows. The case that is the one more probable to happen is where the two curve lines are closer. Another result of this phase

of the process is the delimitation of the Zone of Possible Agreement (ZOPA), visible in Figure 1 in the intersection of the two bigger colored rectangles.

This concept was proposed by [11] and denotes the intersection of the range of possible outcomes of the parties, i.e., what can happen. The system then waits for the end of the ODR process in order to know what was the outcome achieved in order to compare it with the outcomes suggested to the parties. If the outcome is the expected, the case chosen was the correct one and its value is increased. If otherwise, the value of the case is decreased. This value denotes the amount of times that it has been chosen with success, i.e., if it is a good case or not. It is a very important parameter in the case as it will eventually dictate if a case is or is not chosen in the future. In fact, this value embodies the ability of the system to adapt to changes in the legislation: when a case is outdated the system eventually ceases to choose it since its value has decreased substantially, being gradually replaced by the new cases.

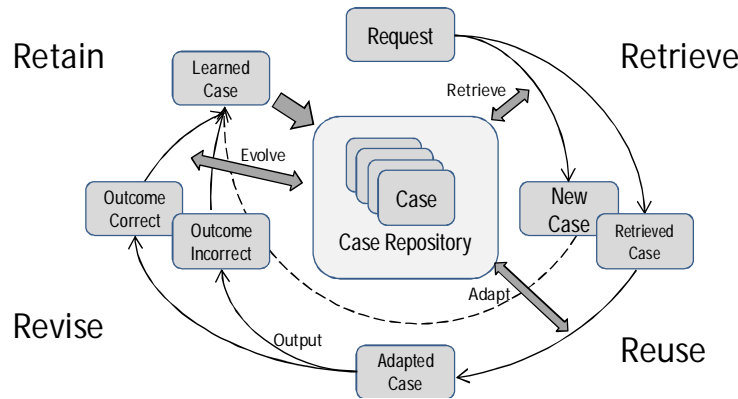


Figure 2. The CBR model used.

In the last phase, Retain, the system evolves according to what happened during the process. This evolution may take place in several aspects, whether it is in terms of the changes in the valor of a case, a new case that is learned by the system or changes to the knowledge embodied by the software agents.

3. Results

The algorithm presented in this paper has been applied to determine the degree of similarity between cases in an attempt to estimate the outcomes of a dispute resolution process. It allows its users to have a better notion about the range of situations that could possibly happen at the end of a dispute resolution process as well as the likelihood of these results occurring.

There are, however, other parameters involved that will influence the results of this algorithm, which have not been fully considered. One of them is the needed degree of similarity in order for cases to be considered similar. We are, at the moment, working with a degree of similarity of 0.85, which means that cases with a lower degree of similarity are not considered similar. We need, thus, to use real life cases and corresponding decisions and compare them with the results obtained in UMCourt, in order to determine the correct value observed in real life scenarios that are considered similar. With the use of real case scenarios, we also intend to fine-tune the weights of

each component of the similarity functions, in order to better resemble what happens in real cases. For that purpose we also rely on the help of experts in the field.

These future modifications, however, constitute no major change to the architecture of the system. Rather they will fine-tune the system to better resemble the way that experts decide upon the outcomes of the case.

4. Conclusions

In this paper, we have presented UMCourt. It is a platform intended to provide support for the parties involved in a dispute resolution process. This paper focuses more specifically in the problem of determining the possible outcomes for the cases, based on the observation of past cases and having as motivation the concept of legal precedent. This task has been embodied into the Outcomes agent, an agent that relies on a CBR algorithm. This algorithm also has the ability to learn new outcomes, thus increasing its ability to deal with new laws. As each case has a value associated with it that denotes the effectiveness of its application, changes in this value should reflect changes in the law and, eventually, in its application. UMCourt represents therefore a path to estimate outcomes of dispute resolution processes based on the CBR paradigm. Other paradigms, such as neural networks or optimization algorithms, will also be considered in order to compare the performance and results of different approaches.

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